Hummingbird Elite 3D Pro

Instruction Manual

SPECIFICATIONS

This Super-Micro R/C helicopter has the most advanced capabilities and is considered top-of-the-line. 120 degree eCCPM control, collective main and tail rotors, torque tube tail drive and brushless motor ensure top performance.

MOTOR SIZE:	4100 RPM/Volt
MAIN ROTOR DIAMETER:	520mm
LENGTH:	485mm
WEIGHT:	360-380g with electronics and battery

Century Helicopter Products

Designed and Developed in USA

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Thank You For Choosing The Hummingbird Elite 3D Pro Helicopter From Century!

Introduction

Congratulations on the purchase of Century Helicopter Product's Hummingbird Elite series helicopter. The Hummingbird Elite is not only ideal for beginners new to the hobby, but also for the intermediate to expert pilot looking for the ultimate in micro electric helicopter performance. The 3D Pro requires a 6+ channel computer radio that supports 120 degree eCCPM operation. Please check with your favorite retailer or manufacturer to verify compatibility of your radio system of choice.

Required Items

Items needed to fly the Hummingbird
1x Radio (6 channels)
1x Receiver (6 channels)
4x Micro servos
1x Micro gyro
1x Brushless motor (4100 RPM/Volt)
1x Brushless speed controller
1x Battery (11.1V Li-Poly or Li-Ion)
1x Charger (Li-Poly or Li-Ion type)

Warning

This radio controlled model is not a toy! It is a precision machine requiring proper assembly and setup to avoid accidents. It is the responsibility of the owner to operate this product in a safe manner as it can inflict serious injury. The helicopter is made pre-assembled and will require inspection for construction before your first flight. As the manufacturer, we assume no liability for the use of this product.

Rules Of R/C

-Always turn your transmitter on before powering the model.

-Always turn off the model by disconnecting the helicopter battery prior to turning off the transmitter.

-Always start the helicopter with throttle in the low position.

-Always perform a pre-flight inspection for safe operation.
These rules will help prevent unsafe operation.

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When You Master Your Hummingbird!

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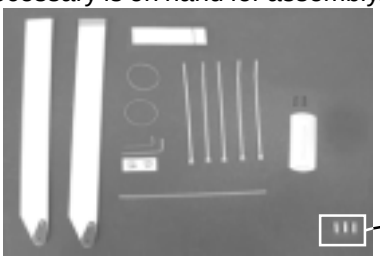
engine radio gyro and muffler sold seperately unless indicated otherwise.

Section 1 — Your New Elite 3D Pro Helicopter Getting Started

CHECKING OVER THE MODEL

Before beginning, check the kit contents. This is a good time to check the "required items" section on page 2 and make sure everything necessary is on hand for assembly.



Important: High Performance Machine:
Check your model before assembling. Check all fasteners and mechanics for tightness and symetry before flying your. Be sure to inspect the model after every flight as a safety precaution.

EXTRAS

Some items that are packaged with the helicopter are not attached to the helicopter. This will include main blades and bolts, antenna tube, tools, servo tape and some fasteners. Brushless motor connectors will only be included if you purchased a 3D Pro motor combo.

INITIAL MECHANICAL ADJUSTMENTS

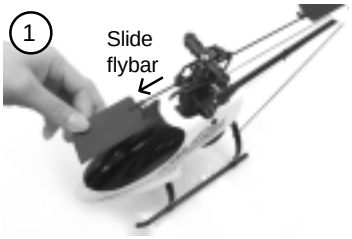
The Hummingbird 3D Pro series flybar and main blades must be set properly after removing from the package.

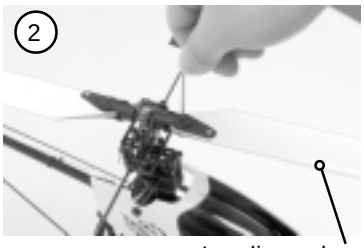
1. Slide the flybar until it is centered in the rotor head having equal length on each side.

2. Tighten the two set screws in the flybar control arms to secure the flybar. Flybar paddles must be parallel to each other and the ground when the swashplate is level. Make sure the screw head in each paddle faces upwards.

3. Install the main rotor blades for clockwise rotation (thick portion of blades are LEADING edge). Use a conservative amount of pressure when installing the blade bolts. The blade tension should be medium and equal on both grips.

4. Remove the canopy and set aside. You will not need the canopy until the end of the setup process.

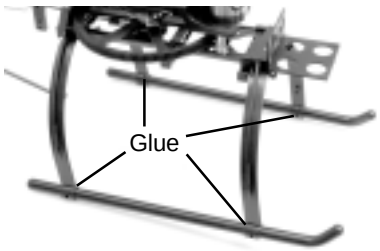


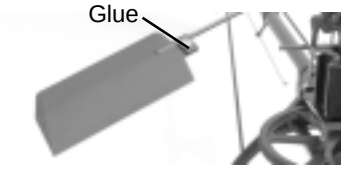


USING ADHESIVES TO SECURE THE MODEL

Check over loose non-moving areas of the helicopter. Secure any loose connections using the adhesive of your choice. Using CA (cyanocrylite) glue is very effective but difficult to debond for maintainance. Household white glue, although not as strong, works well and is easier to dissasemble later.

Warning!
Only use double sided servo tape for mounting your electronics. Glue will damage servos and electronics.



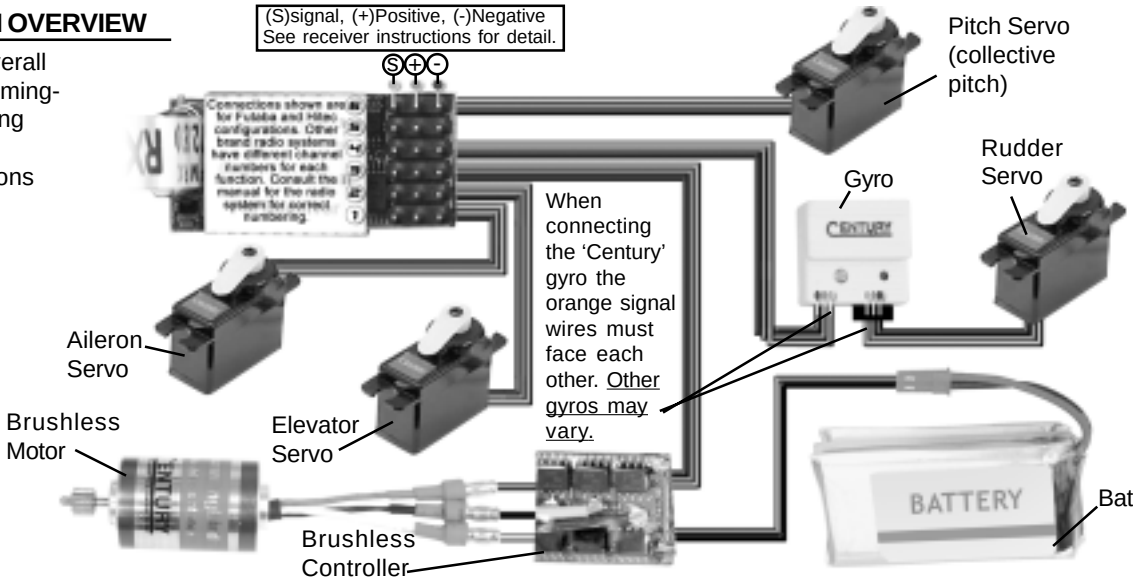


Section 2 — Connection And Diagnostics For The Electronic Components

ELECTRONIC CONNECTION OVERVIEW

This diagram represents the overall connections for wiring the Hummingbird Elite 3D Pro correctly (if using Futaba or Hitec). This diagram includes the separate connections pictured on the following page.

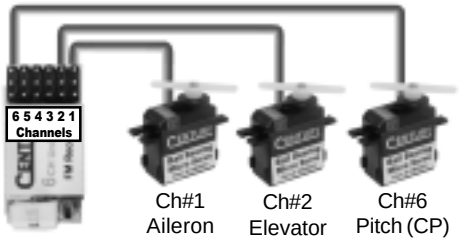
Warning!
Keep electronics from becoming exposed to glue, moisture or extreme temperatures to ensure proper operation.



Section 3 — Connection And Diagnostics For The Electronic Components

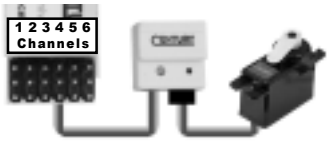
Speed Control Connection

Aileron, Elevator & Pitch Servo Connection



Ch#1 Aileron | Ch#2 Elevator | Ch#6 Pitch (CP)

Rudder Servo & Gyro Connections



The gyro helps the helicopter maintain heading. Without the gyro the helicopter might spin out of control.

Motor Connection

The blades on the helicopter should spin clockwise. If the motor is turining the wrong way, switch two of the motor wires to reverse the rotation.

TESTING AND PREPARATION OF RADIO EQUIPMENT

IMPORTANT:

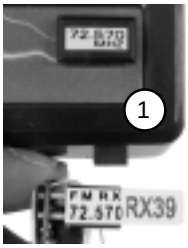
All connections shown in this manual work for Futaba & Hitec radio systems. If you have any other radio system please consult your radio instructions for channel numbering. (some equipment may differ in appearance.) Positive negative and signal pins for the receiver should be marked on the casing of the receiver or in the manual for the receiver.

PLEASE DON'T SKIP THIS SECTION!!!!

Before modifying or installing any radio gear, please take a few minutes to test everything as shown. Time spent becoming familiar with the equipment and testing all the components can prevent difficulty.

1. Install the crystals into the transmitter and receiver. Be certain that the channel frequency matches.

2. Note that all electronics plug into the receiver with the wires as pictured (orange wire faces receiver label). Follow the diagram for each electronic connection. Once the electronics system is connected and the transmitter is turned on, follow this step-by-step process to check your equipment.



Channel numbers must match

Signal, positive & negative are connected correctly

STEP-BY-STEP COMPONENT TEST

1. Turn on the transmitter - Is the transmitter functioning normally?

2. Plug the Battery battery into your Speed controller. Wait for the speed control and gyro to initialize befor moving the helicopter.

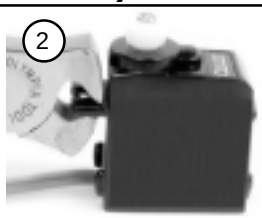
3. Move the aileron, elevator pitch and rudder channels to make sure the servos work. With the gyro connected properly the rudder servo should move when turning the helicopter.

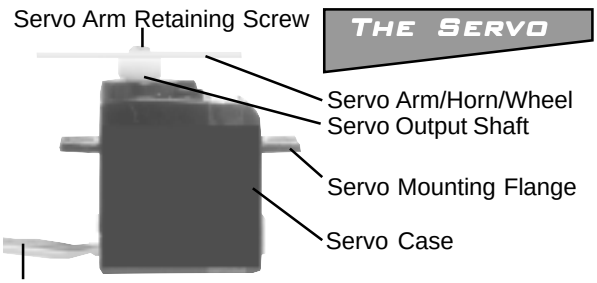
Section 4 — Servo Basics

AILERON, ELEVATOR AND PITCH SERVOS - (*DO NOT MODIFY THE RUDDER SERVO*)

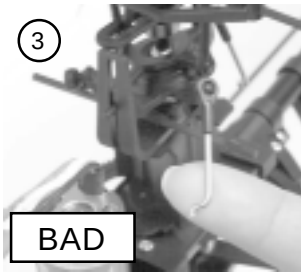
TEST EVERYTHING FIRST!

1 & 2. Trim both servo mounting flanges from each servo.
3. Before installing you will need to remove the pushrods from the swashplate of the helicopter. Keep the pushrods on the side until you install the correct servo arms (next subsection).





IMPORTANT: Do not modify the rudder servo

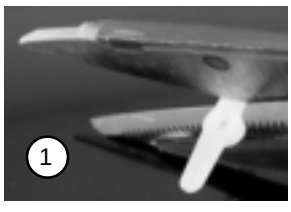


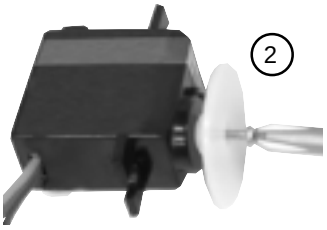
Carefully remove ball link from swashplate ball. Too much force may break the plastic balls.

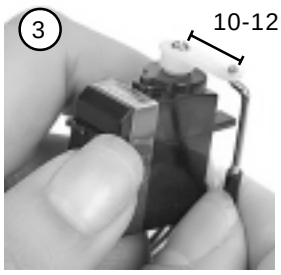
SERVO ARMS AND HORNS FOR THE 3D PRO

1. A long half arm may have to be created by cutting a full or cross arm.

2. After testing the radio equipment the servos will be in their center position. Remove the servo retaining screw and servo wheel. Replace the wheel with one of the long half arms. See section 3 for the final positions for your version.







3. Some servo arms require widening the hole in the arm in order for them to accept the Hummingbird's pushrods using a #55 drill bit [1.34mm or 0.052"].

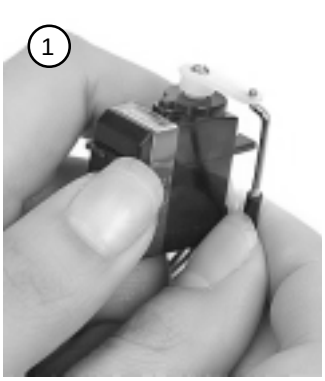
Section 5 — Servo Installation And Pushrod Setup For The 3D Pro

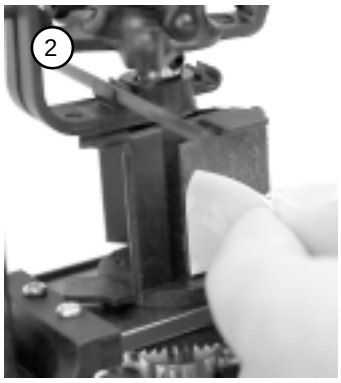
MOUNTING YOUR SERVOS (USE SECTION 4 FOR DETAILS)

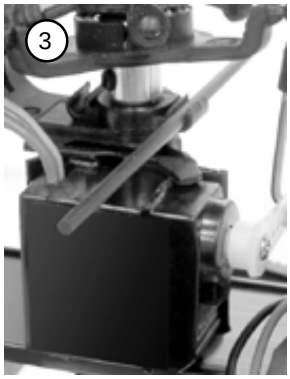
1. Insert the pushrod into the hole on the servo arm farthest from the output (10-12mm from center).

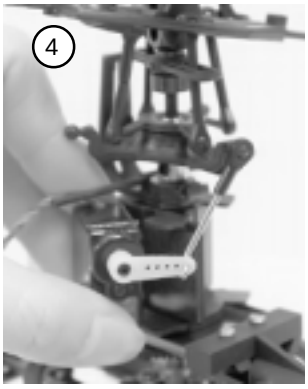
2. Place servo tape on the mounting surface before mounting the servo.

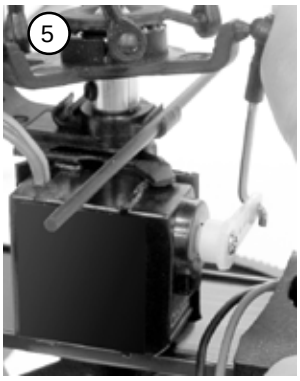
3. Note that the elevator servo is mounted slightly forward (3mm or so). This will ensure that the arm can move freely (avioding contact with the frame).

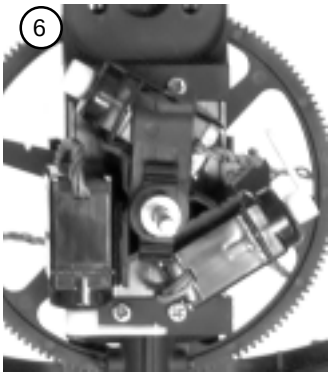












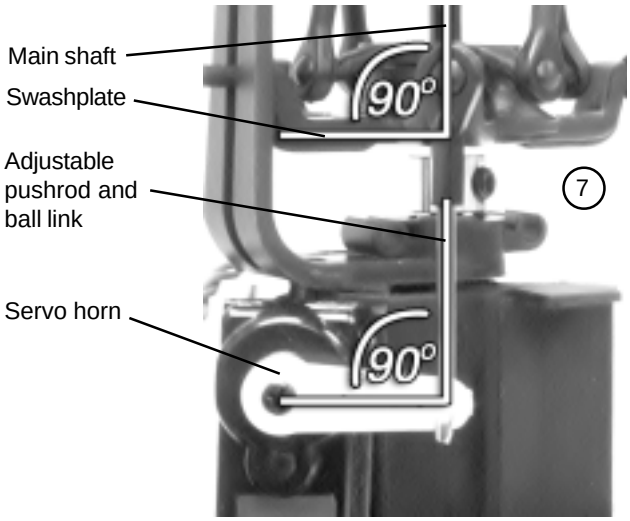
4. If the servo has a label on the same side that will mount with servo tape, peel off the label and clean the surface using rubbing alcohol. Once the mounting position of the servo is determined carefully mount the servo to the mast tower.

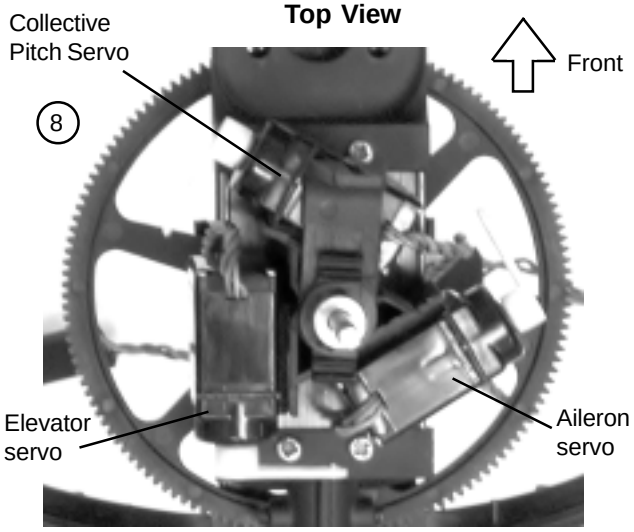
5. After mounting the servo. Place the plastic ball link on the corresponding control ball on the swashplate. Only use the large end of the tapered opening on the ball link.

6. There are 3 servos needed on the 3D Pro. When mounted they should appear as pictured.

7. Turn the radio on with all sticks and trims centered. Verify also that paddles, swashplate & servo horns are parallel to each other and also 90 degrees to the main shaft when all sticks are centered.
Adjust the lengths of the pushrods by twisting the ball links clockwise to shorten. Twist counter-clockwise to increase the rod length.

8.) The Elite 3D Pro helicopter uses the 120 degree eCCPM control system. This system will require a computer helicopter radio that supports 120 degree eCCPM. Refer to Page 6 for detailed instructions on how to use eCCPM.



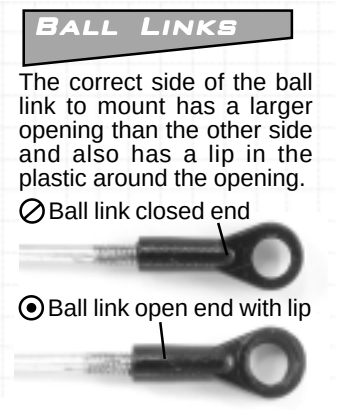


IMPORTANT:

Refer to Page 6 for detailed instructions on how to use the eCCPM control system.

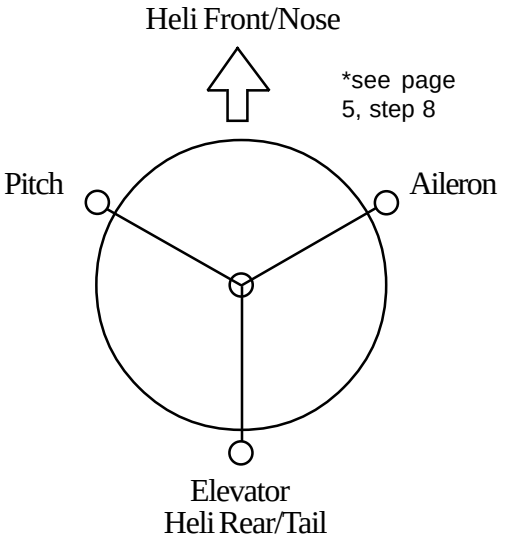
BALL LINKS

The correct side of the ball link to mount has a larger opening than the other side and also has a lip in the plastic around the opening.



Section 6 eCCPM Radio Setup

Expert Tips:
To make the setup go easier on transmitters with 5 or more programmable points on the pitch curve, assuming that the 5 points correspond to low stick, point 1, point 2, point 3 and high stick. Set points 1,2,3 to 50% which will create a flat pitch curve in the center that will allow you to consistently find 50% pitch near mid stick. After servo direction and centering is completed, return points 1 & 3 back to their default values.
For highly aerobatic flying, when the rotor head speed is at 1500rpm or above, bond the flybar paddles in place using cyanoacrylate glue to the flybar.



Radio Setup Procedure

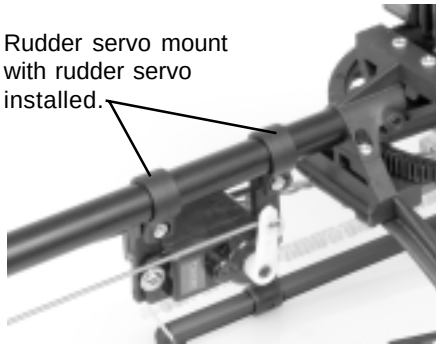
1. It is best to choose a new model memory (if available) and use the Reset feature to remove any previous settings or mixes. Remember this usually also returns the radio configuration to single servo.
2. Locate and activate the swashplate mixing for 120^0 ccpm (most manufacturers set single servo on channel 6 by default).
3. Return both the aileron and elevator trims and subtrims to center along with any hover pitch knobs.

Collective Pitch Setup:

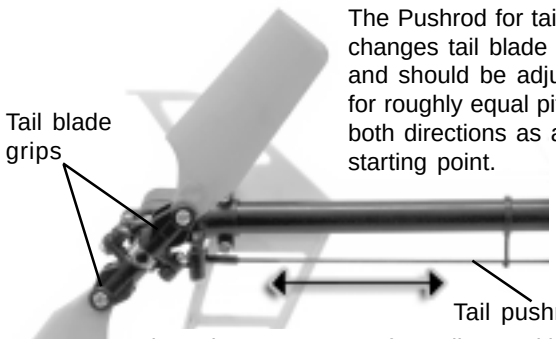
4. Power on the transmitter and the helicopter without the motor connected. Power on the model. Center throttle/collective stick to 50% and find the correct servo arm that is closest to 90^0 degrees (slightly up or down is ok).
5. Watch as the collective stick is moved that all three servo arms move in the same direction. Any servo that is moving in the wrong direction should be corrected using the servo reverse function for that channel. Continue until all three servos work together to move the swashplate in the same direction.
6. Watch as the collective stick is raised that the swashplate moves upwards. If it moves downwards, go to the ccpm swashplate menu and change the default setting to be opposite, for example, if Pitch is set to +60 then change to -60 and retest.
7. While looking from the back of the helicopter, check that when the elevator stick is moved forward that the swashplate tips forward and when the aileron stick is moved left the swashplate tips left. If the swashplate moves in the wrong direction, change the direction from the same ccpm swashplate menu. Change from the default value of +60 to -60 and retest.
8. Now that the servos are moving in the correct directions, the servo horn must be trimmed using the internal subtrim feature to position the arm be 90 degrees to its pushrod (and to the length of the servo), use the subtrim (or centering feature) to achieve this angle, be as precise as possible.
9. Carefully remove the three pushrods from the swashplate and verify the length is 25mm from the “z” bend to the center of the ball link. Remove each servo horn one at a time and drill the last hole (photo) using a #55 drill bit [1.34mm or 0.052”] that locates the pushrod at 11-12mm from the center of the servo arm pivot point.
10. Now that the basic radio setup procedure is completed, return to your pitch curve function and restore points 1 & 3 to their default valves, usually 25% and 75%. Move the collective stick from low to high and watch the swashplate, if the swashplate bends at the low or high position, reduce the pitch value in the ccpm menu, for example if the value is -60 try -55 and repeat the test. Continue until the swashplate moves to the limits but does not bend.
11. Move the cyclic (aileron and elevator) sticks to the full horizontal and diagonal positions and see if the swashplate is binding against the main shaft. If it does, return to the ccpm menu and reduce the value for the servo that is binding. While holding the cyclic stick in the corner, slowly rotate the rotor head and again watch the swashplate for binding.

Section 7 Tail Setup: Tail Pushrod, Servo And Blade Grips

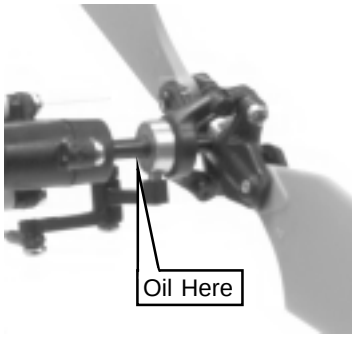
When the main shaft turns clockwise the tail rotor should also turn. If the tail does not turn or if it seems to skip, check the gears inside the tail boom and gearbox. Right rudder input should turn the nose to the right. Left rudder input should turn the nose to the left. The servo controlling the rudder is mounted on the tail boom just aft of the main mechanics. The Rudder servo mount clamps to the tail boom and holds the servo in place with two screws. Make sure the grip of the clamp is secure so the mount cannot shift in any direction.



The servo arm should be positioned for maximum travel range. setting the servo arm at a 90 degree angle to the tail boom will give equal (maximum total) travel distance on both ends of the servo travel range.


Tail blade grips
The Pushrod for tail changes tail blade pitch and should be adjusted for roughly equal pitch in both directions as a starting point.
Tail pushrod

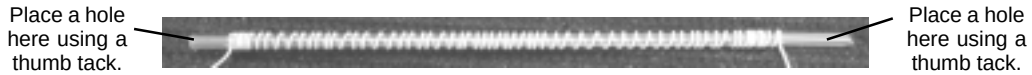
The only way to get perfect tail control is to test your settings and adjust until the helicopter responds equally for both directions of rudder control. Keep in mind that the tail is compensating for main rotor torque. Note: main rotor torque turns the helicopter counter-clockwise.



Place a tiny bit of oil (any good lubricant for metal on metal) on the tail output shaft. This will keep the tail pitch slider sliding smoothly on the output shaft.

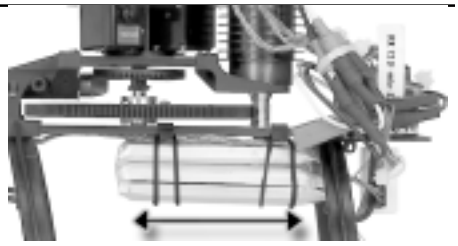
ROUTING THE ANTENNA

To provide the best possible reception for the model, the Hummingbird Elite comes with a plastic tube for routing the antenna. Put a small hole in one end and pull the antenna all the way through leaving about 2 to 3 inches of slack. Wrap the antenna around the tube. After the antenna is almost completely wrapped around the plastic tube place a hole at the other end of the tube to secure the end of the antenna. The Hummingbird Elite series helicopters have brackets in the landing gear for mounting this plastic tube.



MOUNTING THE BATTERY

The 3D pro is provided with 2 battery mounting standoffs. Place the battery against the standoffs to test alignment and reinforce the battery with a small amount of double sided tape or industrial strength velcro so the battery does not shift.
The battery holders slide back and forth on the lower frame so you can adjust the center of gravity on the helicopter.
To test your results hold the helicopter by the flybar (flybar should be 90 degrees from tailboom). Move the battery to have the helicopter sit level or very slightly nose heavy.



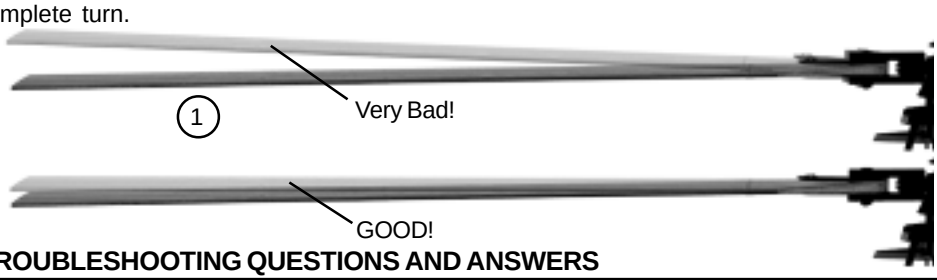
Moving the battery back or forward will help adjust center of gravity

ADJUSTING THE BLADE TRACKING

Tracking Adjustment

1. Tracking refers to trimming the actual pitch of the main rotor blades to be equal. On the first flight, bring the rotor head up to speed without leaving the ground and look at the side or profile of the rotor disk (FROM A VERY SAFE DISTANCE, MAKING SURE TO WEAR EYE PROTECTION).

2. Only one rotor blade should be visible, if there are two distinctive blades then the tracking linkage must be changed. Observe which blade is tracking above the other by marking one first. Carefully remove the ball link on that blade grip and shorten the link by one complete turn.



TROUBLESHOOTING QUESTIONS AND ANSWERS

Q: Everything is on and connected. Why won't the rotors turn?
A: -The throttle may not be set in the transmitter or a connection may be loose or diconnected.
-Be sure to follow the guidlines given for the speed controller. Your transmitter or speed controller programming may have to be adjusted for use with an R/C helicopter.

Q: Why does the helicopter spin like a top?
A: -It's possible that the rudder channel on your radio is reversed or your gyro is installed improperly.
-You may simply need to adjust a few settings in the transmitter for additional sensitivity.
-Check the connections to the receiver to make sure connections are correct. If the problem persists take a look at the direction the rudder servo moves when the gyro is activated in relation to the tail rotor pitch.
-Check the pitch control linkage on the tail rotor from endpoint to endpoint making sure the blades have enough pitch and pitch enough in each direction.

Q: Why is there vibration?
A: -The main blades may be out of track. Refer to the blade tracking information above.
-The main shaft may be bent. This can be difficult to notice when the blades are not moving. A bent main shaft can be caused in a crash or a hard blade strike.
-Vibration can also result from any loosely connected components such as the battery tray or the landing gear. Make sure to secure them and be sure to check the frame and flybar every time you crash or have a hard landing as they may need to be repositioned.

Q: Why won't the helicopter come off of the ground?
A: -Be sure that the gear mesh on the main motor moves smoothly and that the battery is fully charged.
-If you don't think it's the battery it's possible that slightly damaged blades are reducing the possible lift. If there is a part of the blade broken off especially near the tip the helicopter may not lift properly.
-Check to make sure nothing is rubbing against the main gear possibly slowing its RPM.
-Observe the travel of the collective. Based on varying climates and altitude conditions your endpoind positions may need to be modified to give it additional pitch. OR:
-You may have too much pitch. Too much pitch will lower your head speed to a point too low to lift the helicopter. Use the throttle and pitch curve settings in your transmitter to find the best rotor head speed and pitch for at least 3 points on the pitch/throttle.

Q: Why is it so difficult to move the helicopter backwards (or any direction)?
A: -Check all servo movement when the helicopter is in motion and stationary. You are looking for any control input that causes the servo or pushrod in that area to get caught or bind. After discovering any bind eliminate it by adjusting servo travel or pushrod length. (it is unnecessary to increse the length of any pushrod or the travel on any servo to a point that may cause binding.)

Q: Why does the helicopter operate on its own without my command inputs?
A: -You may be getting hit with interference. RF interference can occur for many reasons. Ordinary household electronics, televisions, cell phones, microwaves, electric tools and other R/C models can add to the field of interference affecting your model. Try turning off unnessesary electronics or find an area where there are less electrical disturbances.

Q: Why does the helicopter still move too far forward or backward even after adjusting the servo arm positions and trims?
A: -The helicopter may not have an even center of gravity. You can slide the battery in it's mounting tray to adjust it's center of gravity.
-You can also combine your battery weight centering with trims and servo arm positions to get any desired combination.
-Mount the electronics in the front of the helicopter to avoid being tail heavy. Having the helicopter slightly nose heavy helps improve forward flight on a helicopter (R/C or otherwise).

BASIC HOVERING

Hovering

When all is set, ready and checked, it's time for the initial flight. Try setting aside a 5 foot diameter circle as a takeoff and landing pad. Keeping the helicopter inside the landing are will help improve your training.

1. Turn the transmitter on first! Turn helicopter on (plugging in the battery) and stand behind the model about 10 feet away.
2. Always watch the nose of the helicopter, move the rudder left and the nose will move left.
3. Start by increasing the throttle slowly until the helicopter rises 1 foot off the ground then set it back down.
4. Repeat this process until you become comfortable with holding the model in the same spot for a few seconds then land it.

After some time at this you can increase the height slightly up to 2-5 ft. (be very carefull not to fly too high) as you are practising taking off and landing. This is the most basic but required skill for the beginner to learn. Above 2 feet training gear become ineffective.

The many types of hovering

It cannot be stressed enough that mastering the hovering skill is crucial to becoming a good helicopter pilot. As you progress in your learning, always practise hovering until you are completely comfortable in holding the helicopter in any direction at any altitude.

1. Pilot view - helicopter facing away from you
2. Sideways - Looking at either side of the helicopter left and right
3. Nose in - nose pointing at you

Perfecting hovering enables you to learn all the types and styles of helicopter flying, forward flight, loops and rolls, 3D (aerobatic flying) and anything you want to do with your helicopter as it can be set up for beginner through to expert. Lastly, have fun!

PRE-FLIGHT CHECKLIST

1. After turning the radio on, move each servo separately looking for unusual or excessive movement.
2. Inspect the main and tail rotor blades for damage. Never fly damaged blades.
3. Inspect the main and tail rotor linkage for play or binding.
4. Turn the main gear in both directions to feel if a problem is developing.
5. Check the electronics connections making sure everything is correct.

TRIM AND THROTTLE ADJUSTMENTS

Control Movement - All trimming of the Hummingbird should be done one click or detent of the subtrims at a time until it will rise without moving left, right, forward or backward at a location without wind. Some tail rotation is normal at lift off until it is hovering. Start by lifting the Hummingbird 3-6 inches at a time to practice lift off and landing.

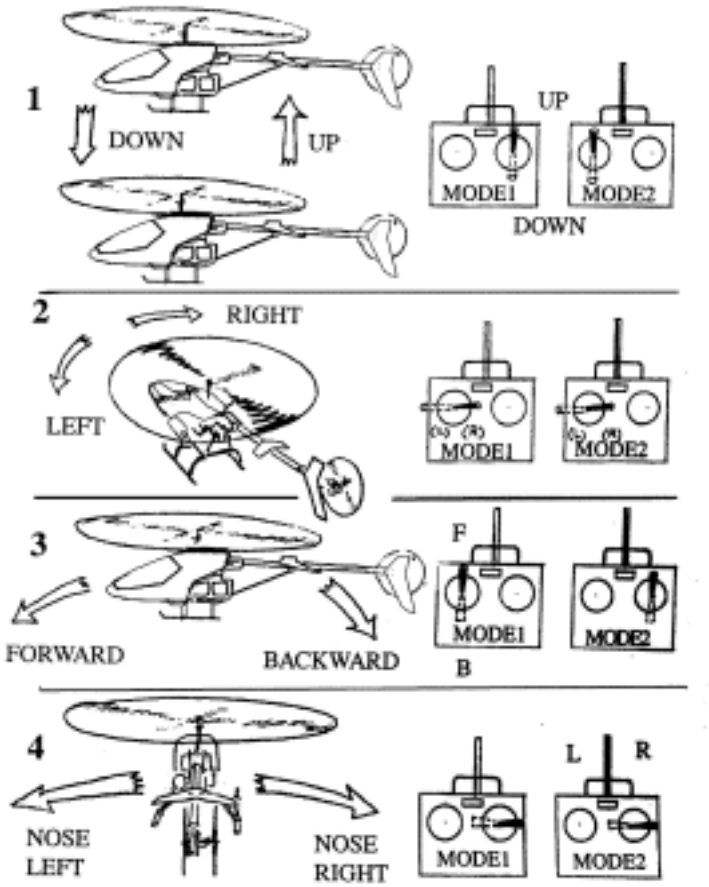
All trim adjustments are to allow you to lift the helicopter straight up and can be made one click or detent at a time on the radio.

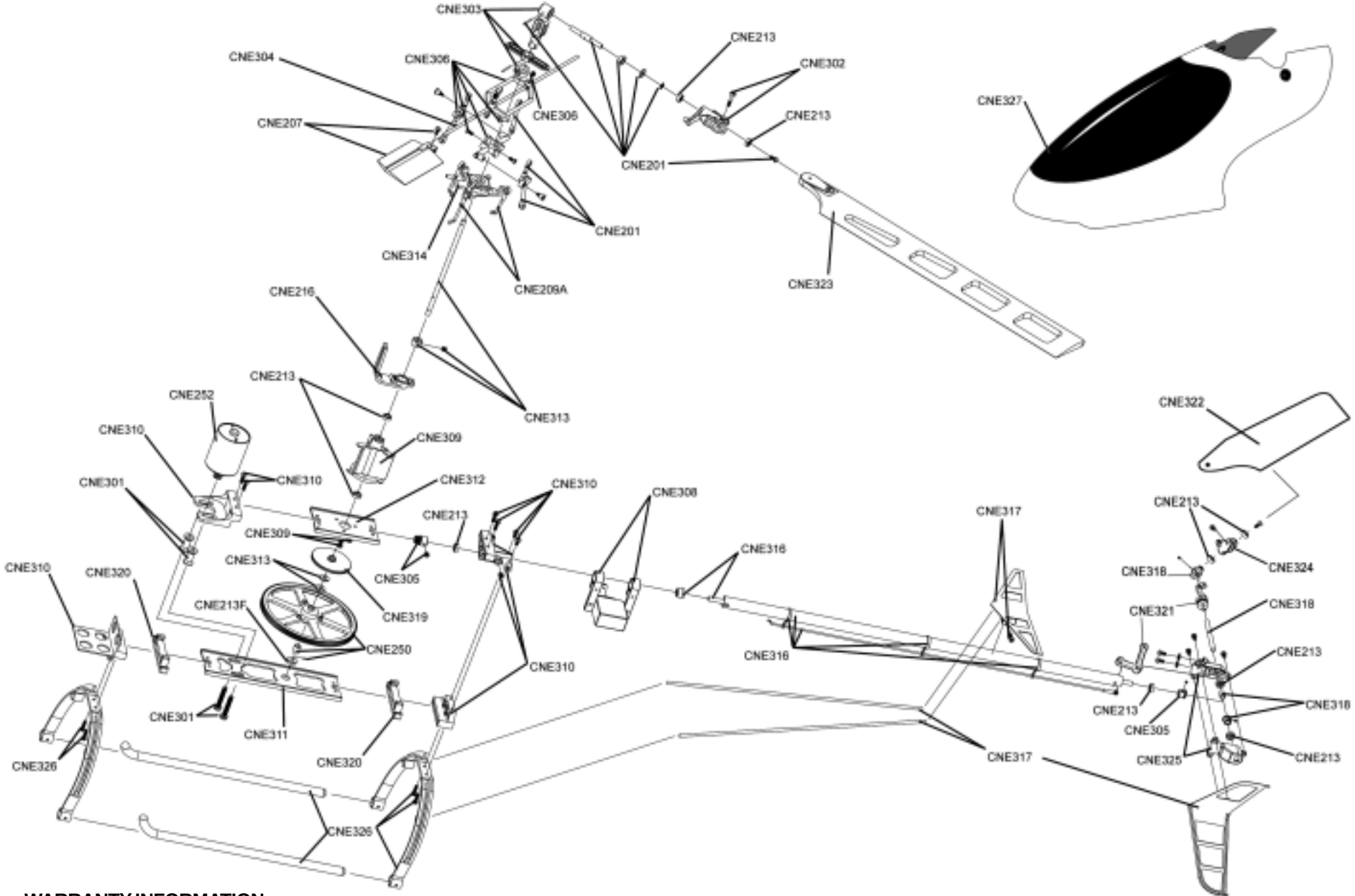
(1) **Collective & Throttle:** Slowly raise the throttle stick, the helicopter should lift off at half stick. If it tends not to lift off increase the hover pitch on the radio or increase the throttle trim. If the helicopter lifts off before mid stick decrease these settings. (collective present in CP model only.)

(2) **Rudder:** When the helicopter is ready to take off, make a correction trim first then use the rudder stick to control the Left & Right. Note, now is a good time to make a final adjustment on the gyro.

(3) **Elevator:** If at hover the helicopter tends to move forward, move the trim down, if it moves backward move the trim upwards Use the elevator stick to control the Forward & Backward.

(4) **Roll (Aileron):** If at hover the helicopter tends to move left, move the trim right, if the helicopter moves to the right move the trim left. Move the Aileron stick to control the slide of the helicopter to the Right & Left.





WARRANTY INFORMATION

Your new equipment is warranted to the original purchaser against manufacturer defects in material and workmanship for 30 days from the date of purchase. During this period, Century Helicopter Products will repair or replace, at our discretion, any component that is found to be factory defective at no cost to the purchaser. This warranty is limited to the original purchaser and is not transferable.

This warranty does not apply to any unit which has been improperly installed, mishandled, abused, or damaged in a crash, or to any unit which has been repaired or altered by any unauthorized agencies. Under no circumstances will the buyer be entitled to consequential or incidental damages. This limited warranty gives you specific legal rights. You also have other rights which may vary from state

CNE201
Head Axle & Dampeners

CNE207
Flybar Paddles

CNE216
Antirotation Bracket

CNE250
Auto Rotation Hub & Gear

CNE213
Main Shaft Bearings
(3x6mm -2pc-)

CNE209A
Swashplate Links

CNE213F
Bottom Plate Flanged
Bearing (Flanged
3x6mm -1pc-)

CNE301
Motor Mount

CNE302
3D Pro Main Blade Grips

CNE303
CNC Rotor Hub & Collar

CNE304
Metal Flybar (2)

CNE305
Tail Drive Shaft Gears

CNE306
Seesaw Assembly

CNE307
3D Pro Head links

CNE308
Rear Rudder Servo Mounts

CNE309
Mast Tower

CNE310
Frame Holders

CNE311
Bottom Frame Plate

CNE312
Top Motor Plate

CNE313
Main Shaft, Spacers & Collar

CNE314
3D Pro Swashplate

CNE315
Tail Drive Shaft Set

CNE316
Tail boom, Pushrod & Guides

CNE317
3D Fins & Boom Supports

CNE318
Tail Rotor Shaft Assembly

CNE319
Inner tail Crown Gear

CNE320
Battery Holders

CNE321
Tail Pitch Lever & Slider

CNE322
Tail Rotor Blades

CNE323
Main Rotor Blades

CNE324
Tail Blade Grip Set
with Bearings

CNE325
Tail Gear Box Set

CNE326
Landing Gear Set

CNE327
Canopy & Decal

CNE252
Lightning Brushless
Main Motor

PHX-10
Castle Creations Brushless
Speed Control

Optional Items

CNE258
Machined Metal Main Rotor
Blade Grips (adjustable)

CNE259
Machined Metal
Swashplate

CNE327C
Clear Canopy & Decal

CNE361
Brushless Motor Heatsink